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Term: L2 and ((transmit$ or assign$) with IP with address$)

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☐ 1. Document ID: US 6618757 B1

L6: Entry 1 of 1 File: USPT Sep 9, 2003

DOCUMENT-IDENTIFIER: US 6618757 B1
TITLE: System and method for dynamic IP address management

Abstract Text (1):
An architecture for dynamic IP address management is disclosed. The architecture includes a gateway (GW) coupled between a private IP network and a public IP network. A dynamic host configuration processor (DHCP) is operatively coupled to the GW. A network address translator (NAT) couples to the GW. Lastly, a processor, operatively coupled to the GW and the DHCP, is provided for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding IP address hold time as a function of an application to be performed. Assignment of the external IP address and a corresponding IP address hold time is in response to a) a request for accessing the public IP network by a subscriber equipment of the private IP network to perform the application, or b) a request for accessing the private IP network by an entity of the public IP network. The external IP address is selected from a prescribed number of external IP addresses available to the private IP network.

Brief Summary Text (5):
Currently, service providers assign private IP addresses (e.g. in the form of 192.x.x.x, where x represents any interger) to subscribers for use within the service provider's private network (or networks). Concurrent in time, more than one service provider may have assigned the same address to one of its respective subscribers or customers. Such an assignment of private IP addresses works fine if all of the respective user activities stay within the corresponding private network.

Brief Summary Text (6):
On the other hand, any request by a user to access the public Internet requires the assignment of a unique public IP address. In connection with accessing the public Internet, service providers have a prescribed set of public IP addresses available to assign to respective subscribers. Equipped with a public IP address, a subscriber may then access the public Internet.

Brief Summary Text (7):
FIG. 1 illustrates a current architecture 10 known in the industry. The current architecture 10 includes a private IP network 12 coupled to the public Internet 14 through a gateway (GW) 16. The service provider of the private IP network assigns public IP addresses to subscribers via a Dynamic Host Configuration Processor (DHCP) 18 and a Network Address Translator (NAT) 20. The NAT 20 maintains a table of entries for keeping track of current external (public) IP address(es) that are associated with an active subscriber's internal (private) address. When a private network subscriber desires to access the external Internet 14, the GW 16 sends a

request to the DHCP 18. In response to the request, the DHCP 18 assigns an available unique external IP address for the respective subscriber to use for external activities. When the subscriber is finished (or ends an external Internet access session), the subscriber informs the GW 16. The GW 16 then sends a release message to the DHCP 18, wherein the external IP address is again made available for use.

Brief Summary Text (12):
According to one embodiment, an architecture for dynamic IP address management includes a gateway (GW) coupled between a private IP network and a public IP network. A dynamic host configuration processor (DHCP) is operatively coupled to the GW. Lastly, a dynamic IP address management (DIPAM) processor is operatively coupled to the GW and the DHCP, for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding IP address hold time as a function of an application to be performed. Assignment of the external IP address and a corresponding IP address hold time is in response to a) a request for accessing the public IP network by a subscriber equipment of the private IP network to perform the application or b) a request for accessing the private IP network by an entity of the public IP network. The external IP address is selected from a prescribed number of external IP addresses available to the private IP network.

Detailed Description Text (2):
According to the present embodiments, a prescribed system unit of the private network, for example, the gateway (GW) or the dynamic host configuration processor (DHCP), manages the assignment of public IP addresses external to a private network.

Detailed Description Text (3):
In addition, a hold time is assigned to each external IP address, based upon application type. In this manner, the service provider can more efficiently manage and dynamically control assignment of external IP addresses.

Detailed Description Text (4):
Referring now to FIG. 2, an architecture 50 for dynamic IP address management includes a gateway (GW) 52 coupled between a private IP network 54 and a public IP network 56. A dynamic host configuration processor (DHCP) 58 couples to the GW 52. Lastly, an address assignment means 60, operatively couples to the GW 52 and the DHCP 58, for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding address hold time as a function of an application to be performed. In one embodiment, the external IP address assignment means includes a suitable processor or computer, the processor or computer being programmed using programming techniques known in the art for performing the various functions discussed herein. Such an assignment of an external IP address is in response to I) a request for accessing the public IP network by a subscriber equipment of the private IP network 54 to perform the application or ii) a request for accessing the private IP by an entity of the public IP network. The external IP address is selected from a prescribed number of external IP addresses available to the private IP network.

Detailed Description Text (5):
The dynamic external IP address assigning means 60 further includes means for determining whether the IP address is actively being used by the subscriber. Responsive to a determination that the IP address is not actively being used, the external IP address assigning means 60 determines whether the hold time has expired. Responsive to an expiration of the hold time, the IP address assigning means releases the assigned IP address for reallocation. A suitable timer 62 is provided to perform two functions: monitor a given hold time and determine whether an IP address is actively being used by the subscriber. Lastly, a Network Address Translator (NAT) 64 maintains a table of entries for tracking current external (public) IP address(es) that are associated with an active subscriber's internal

(private) address.

Detailed Description Text (6):
According to one embodiment, the dynamic external IP address assigning means 60a is resident within the DHCP 58. The dynamic external IP address assigning means 60a further includes a timer 62a for monitoring an expiration of an assigned IP address hold time. Responsive to a request, the DHCP 58 determines an assigned IP address hold time as a function of the application. Further responsive to the request, the DHCP 58 notifies the GW 52 of the assigned IP address and the assigned IP address hold time. A timer 62, in this embodiment, will still be needed in the GW 52. The timer 62 records the IP address hold time. In addition, the timer 62 monitors subscriber traffic to determine whether an IP address is actively being used by the subscriber. In a preferred embodiment, the timer 62 monitors packets sent to or sent by the subscriber as they pass through the GW 52. As long as the delay between every two consecutive packets of the subscriber is within a prescribed amount of time (determined by the application), timer 62 considers the IP address of the subscriber to be active. If the hold time for the IP address expires while the IP address is active, timer 62 automatically renews the hold time for the IP address and requests the DHCP timer 62a to renew the hold time for the IP address. Responsive to the expiration of the assigned IP address hold time, when the IP address is not active, the DHCP 58 releases the assigned external IP address for reallocation.

Detailed Description Text (7):
In another embodiment, the dynamic external IP address assigning means 60 is resident within the GW 52. Responsive to a request, the GW 52 determines an assigned IP address hold time as a function of the application. Further responsive to the request, the GW 52 submits the request to the DHCP 58. The DHCP 58 then notifies the GW 52 of the assigned IP address. In one embodiment, the dynamic external IP address assigning means 60 includes a timer 62 for determining whether an IP address is actively being used by the subscriber and for monitoring an expiration of an assigned IP address hold time. In a preferred embodiment, the timer 62 monitors packets sent to or sent by the subscriber as they pass through the GW 52. As long as the delay between every two consecutive packets of the subscriber is within a prescribed amount of time (determined by the application), timer 62 considers the IP address of the subscriber to be active. If the hold time for the IP address expires while the IP address is active, timer 62 automatically renews the hold time for the IP address. Responsive to the expiration of the assigned IP address hold time, when the IP address is not active, the GW 52 communicates information to the DHCP 58 for releasing the assigned external IP address for reallocation. Note that, unlike the previous embodiment, a timer 62a is not needed.

Detailed Description Text (8):
The architecture for dynamic IP address management may also include a gateway (GW), a dynamic host configuration processor (DHCP), a dynamic IP address management (DIPAM) processor, and a network address translator (NAT). The GW couples between a private IP network and a public IP network. The dynamic host configuration processor (DHCP) couples to the GW. The DIPAM processor operatively couples to the GW and the DHCP for dynamically assigning an external IP address and a corresponding address hold time. The DIPAM processor dynamically assigns the external IP address and a corresponding address hold time as a function of an application to be performed and in response to a request for accessing the public IP network by a subscriber of the private IP network to perform the application or in response to a request for accessing the private IP network by an authorized entity of the public IP network to perform the application. The DIPAM processor selects the external IP address from a prescribed number of external IP addresses available to the private IP network. Lastly, the DIPAM processor consults the NAT to translate correctly between public IP addresses and private IP addresses so that packets are sent to correct destinations. The NAT couples to the GW.

Detailed Description Text (9):
According to a method of the present disclosure, implementing dynamic IP address management includes providing a gateway, providing a dynamic host configuration processor (DHCP) coupled to the GW, providing a network address translator (NAT) coupled to the GW, and providing a dynamic IP address management (DIPAM) processor. The gateway (GW) couples between a private IP network and a public IP network. The DIPAM processor operatively couples to the GW and the DHCP. The processor dynamically assigns an external IP address and a corresponding address hold time as a function of an application to be performed, in response to a request for accessing the public IP network by a subscriber of the private IP network to perform the application or in response to a request for accessing the private IP network by an authorized entity of the public IP network to perform the application. The processor selects an external IP address from a prescribed number of external IP addresses available to the private IP network. The DIPAM processor consults the NAT to translate correctly between public IP addresses and private IP addresses so that packets are sent to correct destinations.

Detailed Description Text (10):
Another method of implementing dynamic IP address management includes providing a gateway (GW) coupled between a private IP network and a public IP network. A dynamic host configuration processor (DHCP) couples to the GW. A network address translator (NAT) couples to the GW. Lastly, a DIPAM processor is provided. The DIPAM processor operatively couples to the GW and the DHCP for dynamically assigning an external IP address and a corresponding address hold time. The DIPAM processor assigns the external IP address and corresponding address hold time as a function of an application to be performed and in response to a request for accessing the public IP network by a subscriber of the private IP network to perform the application or in response to a request for accessing the private IP network by an authorized entity of the public IP network to perform the application. The processor selects the external IP address from a prescribed number of external IP addresses available to the private IP network. The DIPAM processor consults the NAT to translate correctly between public IP addresses and private IP addresses so that packets are sent to correct destinations. The processor is further for determining whether the IP address is actively being used by the subscriber. Responsive to a determination that the IP address is not actively being used, the processor determines whether the hold time has expired. Responsive to an expiration of the hold time, the processor releases the assigned IP address for reallocation.

Detailed Description Text (12):
In response to identification of the application, an external IP address and hold time are assigned to the user in Step 76. That is, a given external IP address and hold time are assigned as a function of the particular application being requested. For example, if the application is HTTP, a hold time on the order of 180 seconds may be assigned. The correspondence between the private IP address of the subscriber and the assigned IP address is recorded in the NAT. In Step 78, the external address is checked to determine whether or not it is being actively used. If yes, then the process repeats Step 78, so long as the external address is actively being used. On the other hand, if the external IP address is not being actively used, the process advances to Step 80.

Detailed Description Text (13):
In Step 80, a determination is made whether or not the hold time has expired. If the hold time has not yet expired, then the process returns to Step 78 for again checking whether or not the external IP address is actively being used. If, in Step 80, the hold time has expired, then the external IP address is released in Step 82 for reallocation to another user. Also, in Step 82, DIPAM requests the NAT to discard the record of the correspondence between the private IP address of the subscriber and the assigned IP address. The process then ends.

Detailed Description Text (14):
An alternative and simpler implementation for Steps 78 and 80 result in an interrupt driven implementation. As with the previously described implementation, a timer is initiated for each user's request. If a timer expires, the IP address is released and allowed to be reused. If a user request is received and there is an IP address assigned, the timer is reset. This eliminates the need to monitor if an IP address is being actively used since, by definition, an IP address is being used if the timer has not expired.

Detailed Description Text (15):
Accordingly, the method and apparatus of the present embodiments associate an external IP address with a subscriber only while the subscriber is actively using the external IP address. If an IP address has been assigned and is not being actively used, the service provider takes the IP address away and makes it available for assignment to a different subscriber. In this manner, additional subscribers can be more readily serviced with the finite external IP address list. An example of GW is the GPRS GGSN (i.e., General Packet Radio Service (GPRS) Gateway GPRS Support Node (GGSN)) in the wireless GSM standard.

Detailed Description Text (19):
With the embodiments of the present disclosure, a subscriber is assigned (and able to keep) an external IP address only for as long as a conversation is active. For example, a conversation occurs each time a web document is transferred. Transfer of a web document (alternatively, a web document transfer event) corresponds, in many instances, to multiple file transfers. The multiple file transfers correspond, in turn, to multiple connections. The multiple connections usually include at least one connection for some HTML text and other connections for in-line images.

Detailed Description Text (21):
According to the present embodiments, the DIPAM processor of the GW and/or the DHCP dynamically control assignment of the external IP addresses of a service provider in a prescribed manner. Dynamically controlling the assignment of external IP addresses allows for an increased number (in some instances, a maximum number) of subscribers to use a finite list of external IP addresses of the service provider. Dynamic control can be accomplished as discussed in the following.

Detailed Description Text (22):
In one embodiment, the DIPAM processor of the DHCP performs the dynamic control. Currently, a request to the DHCP for accessing the external IP network does not contain an application to be used. According to one embodiment of the present disclosure, a request to access the external IP network includes an application, or an identification of the application. In response to application or an identification of the application, the DHCP assigns an external IP address and an expiration time for the respective IP address as a function of the application. A different external IP address may be required for different applications at different times. The DHCP maintains and/or keeps the respective expiration timers. Upon the expiration of a given timer, the DHCP issues and/or sends a suitable notice (e.g., an expiration or termination notice) to a respective subscriber.

Detailed Description Text (24):
In contrast to the existing art, the external IP addresses, assigned by the architecture of the present embodiments, are assigned and remain assigned for a prescribed duration that a subscriber actively uses the external IP address. In response to a determination that a subscriber does not actively use the IP address (i.e., upon detection of inactive use), the IP address is released from the subscriber for use by other subscribers. Accordingly, a subscriber may be assigned multiple IP addresses during a given session, whereas, in the existing art, a subscriber is assigned an external IP address for an entire session, regardless of whether or not the subscriber actively uses the address.

Detailed Description Text (41):
In the.example of FIG. 6, each handheld device 116 has an internal IP address 192.X.X.X assigned by the wireless provider 112 (where X includes three digits each from 0-9). According to current implementations of WWW, handheld devices 116 use the HTTP protocol to access web pages. HTTP is encapsulated in IP packets. According to IP standards, each IP packet carries source and destination IP addresses. Hence, each IP packet that encapsulates HTTP in the private network carries the internal source IP address of the handheld and the destination IP address of the web server.

Detailed Description Text (44):
In reference again to Step 126, if the destination address is not an internal 192.X.X.X address, then the DIPAM makes a determination whether an external IP address has already been assigned to the handheld (Step 130). In particular, the DIPAM makes the determination by consulting the NAT. If an external IP address has already been assigned to the handheld, then the GW replaces the internal source IP address in the packet with the external IP address (Step 132). The DIPAM then makes a determination whether the hold time for the external IP address has expired (Step 144). If the hold time for the external IP address has not expired, then the GW forwards the newly modified packet to the Internet, where the packet is routed according to current Internet implementations to the destination server (Step 134). In reference again to Step 144, if the hold time for the external IP address has expired, then the DIPAM renews the IP hold time for the IP address (Step 146). The GW then forwards the newly modified packet to the Internet, where the packet is routed according to current Internet implementations to the destination server (Step 134).

Detailed Description Text (45):
In reference again to Step 130, if an external IP address has not been assigned to the handheld, then the DIPAM examines the contents of the IP packet to determine the type of application encapsulated in the IP packet. Responsive to determining the type of application, the DIPAM assigns an appropriate IPHT (Step 136). In the example of FIG. 6, having determined that the application is an HTTP application, the DIPAM selects an appropriate IPHT for HTTP from an IPHT lookup table. The IPHT lookup table is created off-line and can be adjusted as the system administrator deems necessary. The DIPAM then requests an external IP address from the DHCP for the duration of IPHT (Step 138).

Detailed Description Text (46):
In accordance with current implementations of DHCP, the DHCP assigns an external IP address and sends the external IP address to the GW (Step 140). In response, the DIPAM requests the NAT to store the correspondence between the handheld internal IP address and the newly assigned external IP address (Step 142). The GW then replaces the internal source IP address (Step 132) in the packet with the newly assigned external IP address. The DIPAM then makes a determination whether the hold time for the external IP address has expired (Step 144). If the hold time for the external IP address has not expired, then the GW then forwards the newly modified packet to the Internet, where the packet is routed according to current Internet implementations to the destination server (Step 134). In reference again to Step 144, if the hold time for the external IP address has expired, then the DIPAM renews the IP hold time for the IP address (Step 146). The GW then forwards the newly modified packet to the Internet, where the packet is routed according to current Internet implementations to the destination server (Step 134).

Detailed Description Text (49):
Accordingly, a novel methodology and architecture have been disclosed that enable service providers to provide public Internet access to subscribers while managing a limited number of public IP addresses. The new approach, referred to herein as DIPAM, assigns an IP address only when a user actively uses the IP address.

Responsive to a determination that a subscriber does not actively use a given IP address (or detection of inactive use), the IP address is released for use by other subscribers. A user may accordingly be assigned multiple IP addresses during a given Web browsing session, whereas, in the prior art, a subscriber is assigned an IP address for an entire Web browsing session, regardless of whether or not the subscriber actively uses the address. The use of DIPAM advantageously reduces IP address requirements, especially when compared with the naive method of assigning IP addresses for each active user in a busy hour.

Detailed Description Text (50):
As discussed herein above, the embodiments have been concerned with using the DIPAM for private network to public network situations. The present embodiments can also be applied to a private network (PN) alone. In current private networks, IP address are assigned to hosts (i.e., subscriber computers or equipment) as long as the hosts are turned on (i.e., power "ON"). The present embodiments solve the problem when there are more hosts than addresses available within the private network.

Detailed Description Text (51):
FIG. 9 illustrates an embodiment of the present disclosure as it applies to a private network (PN) 170 alone. In the embodiment of FIG. 9, a DHCP 172 includes a DIPAM 174. The DIPAM 174 assigns IP addresses to hosts 176 as long as the hosts 176 are being actively used. More particularly, assignment of IP addresses is carried out in a similar manner as discussed herein with respect to the embodiments for private network to public network Internet communications.

Detailed Description Text (52):
In the embodiment of the private network 170 of FIG. 9, the DIPAM 174 also selects an IPHT. The IPHT may or may not be based on application. For example, the DIPAM 174 can assign a single IPHT for any use or type of application on the private network 170. In addition, a Domain Name Server (DNS) 178 is used instead of a NAT, as in the private network to public network configuration. The DNS 178 maintains a correlation between host name and assigned IP address. For implementation, suitable hardware changes are made to the routers 180, as necessary.

Detailed Description Text (54):
In operation, with respect to the embodiment of FIG. 9, when a host requests use of the network, the host is assigned an IP address. If the IP address is being actively used, then the address is retained. If the host is not actively using the assigned IP address, then the IP address can be taken away from that host and reused for an active host. If after some time of network inactivity, the network is again accessed by the host, then the initial IP address would have been taken away and a new address will be requested. Accordingly, the private network 170 can maintain more hosts than available IP addresses. This embodiment is an improvement over current technology which limits the number of hosts to be less than or equal to the number of available IP addresses.

CLAIMS:

1. An architecture for dynamic IP address management, comprising: a gateway (GW) coupled between a private IP network and a public IP network; a dynamic host configuration processor (DHCP) coupled to said GW; and means, operatively coupled to said GW and said DHCP, for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding address hold time as a function of an application to be performed, in response to a) a request for accessing the public IP network by a subscriber equipment of the private IP network to perform the application or b) a request for accessing the private IP network by an entity of the public IP network, the external IP address selected from a prescribed number of external IP addresses available to the private IP network.

2. The architecture of claim 1, wherein said dynamic external IP address assigning

means further includes means for determining whether the IP address is actively being used by the subscriber equipment, and responsive to a determination that the IP address is not actively being used, determining whether the hold time has expired, and responsive to an expiration of the hold time, releasing the assigned IP address for reallocation.

3. The architecture of claim 1, wherein said dynamic external IP address assigning means is resident within said DHCP.

4. The architecture of claim 3, wherein said dynamic external IP address assigning means includes a timer for monitoring an expiration of an assigned IP address hold time.

5. The architecture of claim 4, wherein responsive to the expiration of the assigned IP address hold time, said DHCP releases the assigned external IP address for reallocation.

6. The architecture of claim 1, wherein said dynamic external IP address assigning means is resident within said GW.

7. The architecture of claim 6, wherein responsive to a request, said GW determines an assigned IP address hold time as a function of the application, further wherein said GW submits the request and the assigned IP address hold time to said DHCP.

8. The architecture of claim 7, wherein said dynamic external IP address assigning means includes a timer for monitoring an expiration of an assigned IP address hold time.

9. The architecture of claim 8, wherein responsive to the expiration of the assigned IP address hold time, said GW communicates information to said DHCP for releasing the assigned external IP address for reallocation.

10. An architecture for dynamic IP address management, comprising: a gateway (GW) coupled between a private IP network and a public IP network; a dynamic host configuration processor (DHCP) coupled to said GW; and a processor, operatively coupled to said GW and said DHCP, for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding address hold time as a function of an application to be performed and in response to a) a request for accessing the public IP network by a subscriber equipment of the private IP network to perform the application or b) a request for accessing the private IP network by an entity of the public IP network, the external IP address selected from a prescribed number of external IP addresses available to the private IP network, wherein said dynamic external IP address assigning processor is further for determining whether the IP address is actively being used by the subscriber equipment, and responsive to a determination that the IP address is not actively being used, determining whether the hold time has expired, and responsive to an expiration of the hold time, releasing the assigned IP address for reallocation.

11. A method for implementing dynamic IP address management, comprising: providing a gateway (GW) coupled between a private IP network and a public IP network; providing a dynamic host configuration processor (DHCP) coupled to the GW; and providing a processor, operatively coupled to the GW and the DHCP, for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding address hold time as a function of an application to be performed, in response to a) a request for accessing the public IP network by a subscriber equipment of the private IP network to perform the application or b) a request for accessing the private IP network by an entity of the public IP network, the external IP address selected from a prescribed number of external IP addresses available to the private IP network.

12. The method of claim 11, wherein providing the processor for dynamically assigning the external IP address and the corresponding hold time further includes determining whether the IP address is actively being used by the subscriber equipment, and responsive to a determination that the IP address is not actively being used, determining whether the hold time has expired, and responsive to an expiration of the hold time, releasing the assigned IP address for reallocation.

13. The method of claim 11, wherein the processor for dynamically assigning the external IP address is resident within the DHCP.

14. The method of claim 13, wherein the processor for dynamically assigning the external IP address includes a timer for monitoring an expiration of an assigned IP address hold time.

15. The method of claim 14, wherein responsive to the expiration of the assigned IP address hold time, the DHCP releases the assigned external IP address for reallocation.

16. The method of claim 11, wherein the processor for dynamically assigning the external IP address is resident within the GW.

17. The method of claim 16, wherein responsive to a request, the processor determines an assigned IP address hold time as a function of the application, further wherein, responsive to the request, the GW submits the request and the assigned IP address hold time to the DHCP.

18. The method of claim 17, wherein the processor for dynamically assigning the external IP address includes a timer for monitoring an expiration of an assigned IP address hold time.

19. The method of claim 18, wherein responsive to the expiration of the assigned IP address hold time, the GW communicates information to the DHCP for releasing the assigned external IP address for reallocation.

20. A method implementing dynamic IP address management, comprising: providing a gateway (GW) coupled between a private IP network and a public IP network; providing a dynamic host configuration processor (DHCP) coupled to the GW; and providing a processor, operatively coupled to the GW and the DHCP, for dynamically assigning to a private IP network subscriber equipment an external IP address and a corresponding address hold time as a function of an application to be performed and in response to a) a request for accessing the public IP network by a subscriber of the private IP network to perform the application, or b) a request for accessing the private IP network by an entity of the public IP network, the external IP address selected from a prescribed number of external IP addresses available to the private IP network, wherein the processor is further for determining whether the IP address is actively being used by the subscriber equipment, and responsive to a determination that the IP address is not actively being used, determining whether the hold time has expired, and responsive to an expiration of the hold time, releasing the assigned IP address for reallocation.

21. An architecture for dynamic IP address management in an IP network, comprising: at least one router; a dynamic host configuration processor (DHCP) coupled to said router; and means, operatively coupled to said router and said DHCP, for dynamically assigning to a first IP network subscriber equipment an IP address and a corresponding address hold time in response to a) a request for accessing the IP network by the first subscriber equipment to perform a network application or b) a request for accessing the IP network by a second subscriber equipment for communicating with the first subscriber equipment, the IP address selected from a prescribed number of IP addresses available to the IP network.

22. The architecture of claim 21, wherein said dynamic IP address assigning means further includes means for determining whether the IP address is actively being used by the first subscriber equipment, and responsive to a determination that the IP address is not actively being used, determining whether the hold time has expired, and responsive to an expiration of the hold time, releasing the assigned IP address for reallocation.

23. The architecture of claim 21, wherein said dynamic IP address assigning means is resident within said DHCP.

24. The architecture of claim 23, wherein said dynamic IP address assigning means includes a timer for monitoring an expiration of an assigned IP address hold time.

25. The architecture of claim 24, wherein responsive to the expiration of the assigned IP address hold time, said DHCP releases the assigned IP address for reallocation.

26. The architecture of claim 21, wherein said dynamic IP address assigning means assigns the IP address hold time as a function of the network application to be performed.

27. A method for implementing dynamic IP address management in an IP network, comprising: dynamically assigning to a first IP network subscriber equipment, via a processor operatively coupled to at least one router and a dynamic host configuration processor (DHCP), an IP address and a corresponding address hold time, in response to a) a request for accessing the IP network by the first subscriber equipment of the IP network to perform a network application or b) a request for accessing the IP network by a second subscriber equipment for communicating with the first subscriber equipment, the IP address selected from a prescribed number of IP addresses available to the IP network.

28. The method of claim 27, wherein providing the processor for dynamically assigning the IP address and the corresponding hold time further includes determining whether the IP address is actively being used by the first subscriber equipment, and responsive to a determination that the IP address is not actively being used, determining whether the hold time has expired, and responsive to an expiration of the hold time, releasing the assigned IP address for reallocation.

29. The method of claim 27, wherein the processor for dynamically assigning the IP address is resident within the DHCP.

30. The method of claim 29, wherein the processor for dynamically assigning the IP address includes a timer for monitoring an expiration of an assigned IP address hold time.

31. The method of claim 30, wherein responsive to the expiration of the assigned IP address hold time, the DHCP releases the assigned IP address for reallocation.

32. The method of claim 27, wherein the processor for dynamically assigning the IP address assigns the IP address as a function of the network application to be performed.

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L1	6618757.pn.	1	L1

END OF SEARCH HISTORY

Freeform Search

Database: US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Term: L1 and (gateway and public and private IP and address$ and Network$).ab.

Display: 10 **Documents in Display Format:** KWIC **Starting with Number** 1

Generate: ○ **Hit List** ◉ **Hit Count** ○ **Side by Side** ○ **Image**

Search Clear Interrupt

Search History

DATE: Monday, May 23, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; PLUR=YES; OP=ADJ			
L2	L1 and (gateway and public and private IP and address$ and Network$).ab.	1	L2
L1	709/$.ccls.	17870	L1

END OF SEARCH HISTORY